

**REMARKS**

Claims 1-12 remain pending in the application with Claims 1 and 9 in independent form. Claims 1 and 9 are currently amended to recite that the method of these claims prepares a reaction product consisting essentially of a silicon-containing polysulfide-type polymer. Support for currently amended claim 1 can be found at least in paragraph [0029] and Examples 1-3 of the subject application as published (specifically, U.S. Pat. Publ. Appl. No. 2006/0235120). Claim 10 is currently amended to recite that the simultaneous mixing is carried out in an atmosphere of inert gas at a temperature within a range from room temperature to 95 °C. Support for currently amended claim 10 can be found at least in paragraph [0027] of the subject application as published. Thus, no new matter is added in the present Amendment. No claims are cancelled or withdrawn in the present Amendment.

Claims 1-12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Pat. No. 3,925,331 to Ely (hereinafter “Ely”). In particular, the Examiner contends that Ely discloses a moisture curable sealant composition which comprises the product of reacting a polysulfide of the formula  $\text{HS}[(\text{CH}_2(\text{R}')_b\text{CH}_2\text{S}_a)_c(\text{R}''\text{S}_a)_d(\text{SH})_f]\text{CH}_2(\text{R}')_b\text{CH}_2\text{SH}$  with a silane of the formula  $\text{Q}_n\text{SiX}_{4-n}$ . The Examiner also contends that in Ely, 3-10% of the SH groups of the polysulfide are reacted with the silane and that addition of a catalyst such as pyridine or sulfur enhances the amount of addition. The Examiner expressly admits that Ely fails to disclose a process wherein both a nitrogen containing base and sulfur are mixed with claimed components (A) and (B). However, to address this deficiency of Ely, the Examiner contends that it would have been obvious to prepare a silicon containing polysulfide type polymer by mixing a vinyl

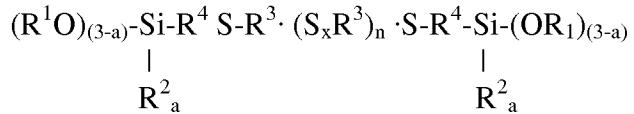
silane, mercapto terminated polysulfide, nitrogen containing organic base and elemental sulfur because Ely teaches that pyridine and sulfur are functional equivalents.<sup>1</sup> In view of the Applicants' Amendment and the reasons set forth in greater detail below, the Examiner's rejection is respectfully overcome for the additional reasons stated herein below.

As expressly admitted by the Examiner, only a small percentage of the SH groups of the polysulfide react with the silane in Ely (see page 2 of the instant Office Action). In particular, Ely "provides a sealant composition maintained under anhydrous conditions, containing unreacted SH groups . . . and tin compounds (or other compounds capable of curing SH terminated polysulphides . . .)" (emphasis added) (see column 2, lines 4-10 of Ely). This is supplemented in column 2, lines 48-55 of Ely, which states that "the reaction being carried out at a temperature and for a time and using a quantity of silane such that for the silane in question the proportion of the SH groups of the polysulphide which react with the silane is from 3% to 30% and the reaction with a silane containing a mercapto group being carried out with presence of a base having a pK of at least 9." (emphasis added). Column 6, lines 35-36 of Ely even states that "[p]referably from 5-20% of the SH groups of the polysulphide and especially 3-15% are reacted with the silane." Thus, it is clear from the teachings of Ely that a minimum of 70%, and up to 97%, of the SH groups remain unreacted after forming the sealant composition, i.e., the polysulphide polymer, in Ely.

Conversely, the subject application claims a method of preparing a silicon-containing polysulfide-type polymer having the following general formula:

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<sup>1</sup> Applicants note that this assertion was addressed in a previous Amendment (filed July 7, 2009), the subject matter of which is incorporated herein by reference but not included in its entirety in an effort to keep this



where  $R^1$  is an alkoxyalkylene group or a monovalent hydrocarbon group with 1 to 10 carbon atoms,  $R^2$  is a monovalent hydrocarbon group with 1-15 carbon atoms, other than monovalent hydrocarbon groups having an aliphatic unsaturated bond,  $R^3$  is selected from an alkylene group with 2 to 10 carbon atoms, an arylene group with 6 to 10 carbon atoms, an alkyleneoxyalkylene group with 2 to 10 carbon atoms, or a divalent organic group of formula:



where  $R^8$  are the same or different alkylene groups with 1 to 10 carbon atoms, and “m” is an integer between 2 and 20, and a hydroxy-substituted alkylene group with 3 to 12 carbon atoms;  $R^4$  is a residue formed in an addition reaction of the aliphatic unsaturated bond contained in component (A) to a hydrogen atom of the mercapto group of component (B), “a” is an integer between 0 and 3, “x” is a number which on average is greater than 1 and smaller than 8 or equal to 8, and “n” is a number with a mean value between 1 and 120.

Clearly, the silicon-containing polysulfide-type polymer claimed in the subject application is distinguished from the reaction product of Ely, which includes a plethora of SH groups. The SH groups are clearly and abundantly present in the reaction product of Ely (in an amount of at least 70% based on the total number of SH groups prior to reaction), and are typically present at the terminal ends of the polysulfide of Ely. Conversely, the silicon-containing polysulfide-type polymer claimed in the subject application has  $OR^1$  and  $R^2$

groups at its terminal ends, which comprise an alkoxyalkylene group or a monovalent hydrocarbon group with 1 to 10 carbon atoms, and a monovalent hydrocarbon group with 1-15 carbon atoms, other than monovalent hydrocarbon groups having an aliphatic unsaturated bond, respectively. In other words, the silicon-containing polysulfide-type polymer of the subject invention does not include SH groups.

Not only does Ely fail to disclose, teach, or even suggest the structure of the silicon-containing polysulfide-type polymer claimed in the method of the subject application, but Ely expressly teaches away from the silicon-containing polysulfide-type polymer formed via the method claimed in the subject application by requiring at least 70% of the SH groups of its polysulfide polymer to remain unreacted for cross-linking with tin compounds. Without the requisite SH groups in the polysulfide polymer of Ely, the polysulfide polymer formed in Ely would be unfit for its intended purpose because the polysulfide polymer would be unable to further react, or cross-link, with other components, such as tin compounds.

“A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.” *In re Gurley*, 27 F.3d 551, 553 (Fed.Cir.1994). As the Examiner is aware, “[a] prior art reference that ‘teaches away’ from the claimed invention is a significant factor to be considered in determining obviousness.” MPEP § 2141.02. Clearly, because Ely expressly requires at least 70% of the SH groups of its polysulfide polymer to remain unreacted for cross-linking with tin compounds, one of skill in the art would have no reason or motivation whatsoever to

form a silicon-containing polysulfide-type polymer as presently claimed (having no SH groups) in view of the fact such a polymer can not undergo further cross-linking with tin compounds, as expressly taught and required by Ely.

The Examiner also contends that “any disclosed method that reads on all the method steps and prepares some of the polymers of the claims reads on the entire claim.” (see page 7 of the instant Office Action). Said differently, the Examiner seems to contend that the method of Ely inherently produces the claimed silicon-containing polysulfide-type polymer in at least trace amounts. However, the Examiner is respectfully reminded that “[t]o establish inherency, the extrinsic evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.” (emphasis added) MPEP § 2112 (citing *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999)). The Applicants respectfully submit that the Examiner has failed to illustrate that the claimed silicon-containing polysulfide-type polymer is necessarily present in Ely, and has merely asserted that it may possibly exist in trace amounts in the reaction product of Ely. Such a conclusory assertion fails to properly establish inherency.

While Applicants make no concession as to the propriety of the Examiner’s assertion and rejection of these claims, independent claims 1 and 9 have been amended to recite that the claimed method prepares a reaction product consisting essentially of a silicon-containing

polysulfide-type polymer with the intent to facilitate prosecution. Such an amendment overcomes the Examiner's assertion that trace amounts of the claimed silicon-containing polysulfide-type polymer are formed in Ely, because any trace amounts formed in Ely were undesirable and the reaction product did not "consist essentially of" such undesirable and trace reaction products. Conversely, the three Examples in the subject application illustrate the instantly claimed method, which resulted in the preparation of the silicon-containing polysulfide-type polymer in the reaction product with a yield ranging from 96.7 % (Example 3) to 97.6% (Example 1). The Applicants appreciate the requirement that the specification or claims must clearly indicate that which is material for the purposes of a "consisting essentially of" amendment. MPEP § 2111.03. The Applicants respectfully submit this requirement is clearly met in view of the expressly claimed structure of the silicon-containing polysulfide-type polymer, as well as the yields set forth in the Examples and the description in the specification of the subject application relating to the removal of undesirable by-products from the reaction product other than the instantly claimed silicon-containing polysulfide-type polymer.

Claims 1-12 also stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Pat. No. 4,096,131 to Price et al. (hereinafter "Price") in view of Ely. In particular, the Examiner contends that Price et al. discloses a process of forming a silyl containing polysulfide polymer by mixing a polysulfide with sulfur and methylvinyldimethoxysilane. The Examiner admits that Price et al. does not disclose a process wherein both a nitrogen containing base and sulfur are mixed with claimed components (A) and (B). However, the

Examiner contends that it would have been obvious to prepare a silicon containing polysulfide type polymer by mixing a vinyl silane, mercapto terminated polysulfide, nitrogen containing organic base and elemental sulfur because Ely teaches that pyridine and sulfur are functional equivalents.

However, the Applicants point out that Price does nothing to cure the deficiency of Ely. In fact, Price perpetuates the deficiency of Ely. For example, column 1, lines 18-25 of Price states “[t]he present invention provides a sealant composition comprising an SH containing reaction product . . .” (emphasis added). Clearly, the reaction product of Price also includes SH groups, as further evidenced in Price itself. For example, Price further states that “the silane having 1 or 2 groups capable of reaction with SH, and the silane reacting with 3-30% of the SH groups of the polysulphide . . .” (emphasis added) (see column 1, lines 36-39 of Price). Finally, Price states that “[t]he sealant composition contains unreacted SH groups . . .” (emphasis added) (see column 1, line 66 of Price). Thus, the teaching of Price is the same as the teaching of Ely, i.e., Price expressly teaches that at least 70% of its SH groups are required to remain unreacted in its polysulfide polymer.

The Applicants respectfully submit that the Applicants’ assertion regarding inherency above is equally applicable to the Examiner’s rejection based on a combination of Price and Ely, i.e., the mere fact that a trace amount of the claimed silicon containing polysulfide-type polymer may possibly be formed in Price is insufficient to establish inherency. Notwithstanding, Applicants amendment of independent claims 1 and 9 respectfully overcomes the Examiner’s rejection over a combination of Price and Ely for the same

reasons as those described above with respect to Ely alone. Thus, the Examiner's rejection of claims 1-10 over Price in view of Ely is also respectfully overcome.

In view of the foregoing, the Applicants submit that independent claims 1 and 9, as well as dependent claims 2-8 and 10-12, which depend therefrom, respectively, are both novel and non-obvious over the prior art including over Ely and Price, either individually or in combination. As such, the Applicants believe the subject application is in condition for allowance, and such allowance is respectfully requested.

The proper fee for a three month extension of time is submitted herewith. However, if necessary, the Commissioner is authorized to charge Deposit Account 08-2789 in the name of Howard & Howard Attorneys PLLC for any additional fees or to credit the account for any overpayment.

**Respectfully submitted,**

**HOWARD & HOWARD ATTORNEYS PLLC**

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Date

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